UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/586,249	05/31/2000	John Erik Lindholm	NVIDP021/P000174	6400

28875 7590 06/04/2003

SILICON VALLEY INTELLECTUAL PROPERTY GROUP
P.O. BOX 721120
SAN JOSE, CA 95172-1120

EXAMINER
GOOD JOHNSON, MOTILEWA

ART UNIT	PAPER NUMBER
2672	17

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/586,249	LINDHOLM ET AL.	
	Examiner	Art Unit	
	Motilewa A. Good-Johnson	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *45,48,49 and 52-62* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *45,48,49 and 52-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *16* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This office action is responsive to the following communications: Application, filed 05/31/2000; Amendment A, filed 09/05/2000; IDS, paper # 3, filed 09/29/2000; IDS, paper #6, filed 09/28/2000; Amendment B, filed 10/16/2000; Amendment C, filed 01/24/2002; Preliminary Amendment D, filed 06/28/2002; IDS, paper #16, filed 03/20/2003; Amendment E, filed 03/24/2003.

This action is made final.

2. Claims 45, 48, 49, 52, 53 and 54-62 are pending in this application. Claims 1-44, 46, 47, 50 and 51 were canceled. Claims 54-62 were added.

3. The present title of this application is "System, Method and Article of Manufacture for a Programmable Vertex Processing Model with Instruction Set" (as originally filed).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 45, 48, 49 and 52-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris et al., U.S. Patent Number 6,097,395, "Dynamic Selection of Lighting Coordinates in a Computer Graphics System", class 345/426, 08/01/2000, filed 04/28/1998.

As per independent claim 45, a method for programmable processing in a hardware graphics accelerator, comprising: receiving graphics data including lighting information in a hardware graphics accelerator; (Harris discloses a geometry accelerator that performs lighting, col. 3, lines 45-51) and performing programmable operations on the graphic data utilizing the hardware graphics accelerator . . . operations are programmable by a user utilizing instructions from a predetermined instruction set . . . operations include a set on less operation. (Harris discloses the lighting subsystem including a dynamic light space selector for processing light information, col. 4, lines 12-27. Harris further discloses that the dynamic determination is implemented in software routines which interoperate with the components of the geometry accelerator, col. 6, lines 54 – col. 7, line 11)

However, it is noted that Harris fails to disclose a set on less operation. Harris discloses clip coordinate of the vertex data to be transformed, col. 6, lines 1-8. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a set on less operation for the clipping performed by Harris to perform dynamic determination by the user of a clipping operation associated with a instruction set.

As per independent claim 48, a method for processing graphics data, comprising: transforming the graphics data utilizing a hardware graphics accelerator; (Harris discloses a geometry accelerator that performs lighting, col. 3, lines 45-51) and lighting the graphics data utilizing the hardware graphics accelerator; (Harris disclose the lighting subsystem including a dynamic light space selector for processing light information, col. 4, lines 12-27, and the dynamic determination is implemented in

software routines which interoperate with the components of the geometry accelerator, col. 6, lines 54 – col. 7, line 11) wherein at least one of transforming and the lighting includes performing operations on the graphics data utilizing instructions from an instruction set . . . including a no operation, a load, a move, a multiply, an addition, and a set on less than . . . each capable of being carried out . . .

However, it is noted that Harris fails to disclose the instruction set as claimed. Harris discloses transforming vertex data form object coordinates into eye coordinates by multiplying the vertex data by a model view matrix, and also discloses performing a matrix division, concatenation of the model view matrix and projection matrix, and clipping of the data. It would have been obvious to one of ordinary skill in the art to implement in the programming language of the dynamic light space selector the instruction set above including no operation, to determine that no operation has been selected, a load, to determine which coordinates systems are being used, a move to determine which coordinate system the model is being transformed into, an addition, to determine the concatenation of the models, and a set on less than, to determine the clip portion of the model systems.

As per independent claim 49, it is rejected based on similar rational as above independent claim 48.

As per independent claim 52, a method for processing graphics data utilizing a hardware graphics accelerator, comprising: transforming the graphics data . . . ; (Harris discloses transforming the graphics data, col. 5, lines 52-54) and lighting the graphics data . . . ; (Harris discloses lighting the data, col. 5, lines 65-67) wherein the

transforming and the lighting include performing operations on the graphics data utilizing instructions from an instruction set capable of being executed by the hardware graphics accelerator . . . set including a no operation instruction, a load instruction, a move instruction, a multiply instruction, an addition instruction, and a set on less than instruction; wherein the transforming and the lighting include negating the graphics data and branching. (Harris discloses the organizational structure of the heuristic to optimize the steps and minimize the resources, col. 14, lines 35-51)

However, it is noted that Harris fails to disclose the instruction set as claimed. Harris discloses transforming vertex data form object coordinates into eye coordinates by multiplying the vertex data by a model view matrix, and also discloses performing a matrix division, concatenation of the model view matrix and projection matrix, and clipping of the data. It would have been obvious to one of ordinary skill in the art to implement in the programming language of the dynamic light space selector the instruction set above including no operation, to determine that no operation has been selected, a load, to determine which coordinates systems are being used, a move to determine which coordinate system the model is being transformed into, an addition, to determine the concatenation of the models, and a set on less than, to determine the clip portion of the model systems.

As per independent claim 53, a method for processing graphics data . . . comprising: transforming the graphics data utilizing the hardware graphics accelerator . . . including constants; (Harris discloses transforming the graphics data including constants, col. , lines) and lighting the graphics data . . . ; (Harris discloses lighting the

data, col. 5, lines 65-67) wherein the transforming and the lighting include performing operations on the graphics data utilizing instructions from an instruction set capable of being executed by the hardware graphics accelerator . . . set including a no operation instruction, a load instruction, a move instruction, a multiply instruction, an addition instruction, and a set on less than instruction; wherein the transforming and the lighting include negating the graphics data and branching; wherein a plurality of the operations are performed in parallel; wherein the hardware graphics accelerator operates with an OpenGL application program interface. (Harris discloses using the OpenGL graphics interface, col. 14, lines 27-28)

However, it is noted that Harris fails to disclose the instruction set as claimed. Harris discloses transforming vertex data from object coordinates into eye coordinates by multiplying the vertex data by a model view matrix, and also discloses performing a matrix division, concatenation of the model view matrix and projection matrix, and clipping of the data. It would have been obvious to one of ordinary skill in the art to implement in the programming language of the dynamic light space selector the instruction set above including no operation, to determine that no operation has been selected, a load, to determine which coordinates systems are being used, a move to determine which coordinate system the model is being transformed into, an addition, to determine the concatenation of the models, and a set on less than, to determine the clip portion of the model systems.

With respect to dependent claim 54, the operations further include a move, a multiply, an addition, a multiply and addition, a reciprocal . . . However, it is noted that

Harris fails to disclose the instruction set as claimed. Harris discloses transforming vertex data form object coordinates into eye coordinates by multiplying the vertex data by a model view matrix, and also discloses performing a matrix division, concatenation of the model view matrix and projection matrix, and clipping of the data. It would have been obvious to one of ordinary skill in the art to implement in the programming language of the dynamic light space selector the instruction set above including no operation, to determine that no operation has been selected, a load, to determine which coordinates systems are being used, a move to determine which coordinate system the model is being transformed into, an addition, to determine the concatenation of the models, and a set on less than, to determine the clip portion of the model systems.

With respect to dependent claim 55, graphics data includes vertex data, and the operations perform vertex processing on the vertex data. (Harris discloses operations performed on the vertex data, col. 6, lines 29-40)

With respect to dependent claim 56, multiple vertices represented by the vertex data are operated upon in parallel. (Harris discloses processing in parallel lighting operations, col. 6, lines 29-40)

With respect to dependent claim 57, graphics data is swizzled. (Harris discloses the dynamic light space selector providing a signal on a line to switches to cause the normal data and vertex data to be input to multipliers, col. 11, lines 49-67)

With respect to dependent claim 58, wherein the instruction set further includes a multiply and addition instruction, a reciprocal instruction, a reciprocal square root instruction, a three component dot product instruction, a four component dot product . . .

However, it is noted that Harris fails to disclose the instruction set as claimed. Harris discloses transforming vertex data form object coordinates into eye coordinates by multiplying the vertex data by a model view matrix, and also discloses performing a matrix division, concatenation of the model view matrix and projection matrix, and clipping of the data. It would have been obvious to one of ordinary skill in the art to implement in the programming language of the dynamic light space selector the instruction set above including no operation, to determine that no operation has been selected, a load, to determine which coordinates systems are being used, a move to determine which coordinate system the model is being transformed into, an addition, to determine the concatenation of the models, and a set on less than, to determine the clip portion of the model systems.

With respect to dependent claim 59, graphics data includes vertex data, and the operations perform vertex processing on the vertex data. (Harris discloses operations performed on the vertex data, col. 6, lines 29-40)

With respect to dependent claim 60, multiple vertices represented by the vertex data are operated upon in parallel. (Harris discloses processing in parallel lighting operations, col. 6, lines 29-40)

With respect to dependent claim 61, graphics data is swizzled. (Harris discloses that the dynamic light space selector providing a signal on line to switches to cause the normal data and vertex data to be input to multipliers, col. 11, lines 49-67)

With respect to dependent claim 62, determine whether the hardware graphics accelerator is operating in programmable mode; performing the operations on the

graphics data . . . ; and operating on the graphics data in accordance with a standard graphics application program interface if it is determined that the hardware . . . is not operating in the programmable mode. (Harris discloses noting if the graphics system is operating in one mode or in another mode, col. 4, lines 30-43)

Response to Arguments

6. Applicant's arguments with respect to claims 45, 48, 49, 52, 53 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Motilewa A. Good-Johnson whose telephone number is (703) 305-3939. The examiner can normally be reached on Monday - Friday 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Motilewa A. Good-Johnson
Examiner
Art Unit 2672

mgj
May 21, 2003

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600